



DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM

Environmental Quality and Protection

Chief Directorate: Air Quality Management & Climate Change

**AQA IMPLEMENTATION: LISTED ACTIVITIES AND MINIMUM
EMISSION STANDARDS**

**OUTPUT B.4
Final Review Report
Draft 2**

REPORT AUTHORS

Gerrit Kornelius

Yvonne Scorgie

1. INTRODUCTION

One of the tools for controlling industrial emissions to the atmosphere is the traditional permit or license which identifies activities that may only operate if they are correctly permitted to do so by the regulatory authority, and only if the conditions set in the permit or license are met. This form of regulation was the basis for regulatory control of industrial emissions in terms of the Atmospheric Pollution Prevention Act (Act No. 45 of 1965) (hereinafter “the APPA”) and has been repeated, with some significant modifications, in the National Environmental Management: Air Quality Act (Act No. 39 of 2004) (hereinafter “the AQA”) as described below.

The objective of the AQA is to provide ambient air quality not detrimental to the wellbeing of South African citizens or the environment. Only industries that materially impact on ambient air quality need therefore be regulated.

To this end, S.21 of the Act requires the Minister or MEC to identify these industries for regulatory control by publishing a list of activities which the Minister or MEC reasonably believe result in atmospheric emissions that have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage. Once identified, these activities are known as “listed activities” .S 21 also requires the setting of minimum emission standards for specified pollutants emitted by the identified industries and the manner in which the emission must be measured.

The Listed Activities/Minimum Emission Standards Project has as its purpose the production of a draft regulation containing a list of activities, emission standards for those activities and monitoring methods for testing compliance. As preparation for the drafting of the regulation, the Department of Environmental Affairs and Tourism requested reviews of various aspects of the listing and standard-setting process. This report is the final report in the review series.

2. SCOPE OF THIS REPORT

This report summarises and consolidates the previously mentioned reviews to propose a final procedure for the listing of activities, the setting of emission standards and the standardisation of compliance monitoring procedures as an input to the National Framework required in terms of s7 of the AQA. This is due for publication in September 2007.

The previous reviews comprise.

- Output B1: International Review of legislation pertaining to listing, standard setting and compliance monitoring
- Output B2: Review of the Transition project, during which initial proposals were made regarding activities to be listed.
- Output B3: Review of Affected Industries Comment, in which comments received from prioritised industries affected by the proposed listing were summarised. Sectors were first requested to respond on specific matters:

3. RECOMMENDATIONS

(1) Adoption of a Phased Approach to Emission Standard Setting

Mindful of the requirements of the AQA, the experience of other countries, and of preliminary consultation undertaken with some affected sectors, a stepped approach to emission standard setting is recommended, comprising the following steps:

- Establish *sector teams* supported by a sector coordinator to carry out the consultation/communication with industry, trade bodies and other affected parties.
- Identification of *key industries and associated pollutants* for which emission standards are to be set at the outset – this would be a subset of those proposed in Table 1 below..
- Sector teams to collate *sector guidance documents* comprising information on best available technology including associated emission standards and monitoring requirements, using international BAT documentation and industry-specific information.
- Sector teams to draft emission standards for the selected industry types in consultation with stakeholders for consideration by DEAT
- Sector teams remain active, gathering current BAT information for use in the establishment of emission standards for additional industry types and the review of previously established emission standards, and for Intermittent additions to the list of activities and publication of relevant national minimum emission standards for these activities .
- Periodic review of national minimum emission standards.

Benefits of the effective adoption and implementation of this approach include more focused regulatory efforts resulting in accelerated air quality improvements, development of an experienced regulator and knowledgeable and cooperative regulated industrial sectors.

(2) Selection of Industry Sector Sub-set for Initial Listing

Based on the conclusions reached in output B2: Revision of the Interim project, the following industry types are proposed for inclusion in the initial list of activities requiring prioritised national emission standard setting, with industries presently not significantly represented in South Africa to be removed or noted for subsequent listing and emission standard setting:

Table 1: Initial list for consideration by sector teams.

RSA – Proposed Listed Activity Categories	Activities included
1. Combustion installations	<ul style="list-style-type: none"> • Coal, gas, biomass and liquid fuel combustion installations • Waste or recovered oil combustion
2. Petroleum industry	<ul style="list-style-type: none"> • Petrochemical production and petroleum refining (including bulk storage and handling of petroleum liquids and petroleum refinery wastewater systems) petrochemicals) • Natural gas reforming • Mineral oil refining • Refining of liquid fuels produced from coal or biomass gasification

RSA – Proposed Listed Activity Categories	Activities included
3. Carbonisation and coal gasification	<ul style="list-style-type: none"> • Coal gasification • Refining or treatment of natural gas, producer gas or synthesis gas • Activities involving pyrolysis, carbonisation, distillation, liquefaction, partial oxidation or other heat treatment of coal, lignite, oil, other carbonaceous materials or mixtures • Processing of the by-products of carbonisation and coal gasification, including tar and bitumen production
4. Metallurgical industry	<ul style="list-style-type: none"> • Aluminium and aluminium alloys • Iron and steel production • Copper smelters • Lead smelters • Zinc smelters • Precious metals production and refining • Refractory metal production • Nickel processes • Cadmium processes • Production of silicon, magnesium, arsenic, selenium antimony, beryllium, chromium • Ferroalloy production (silicon, chromium, manganese, vanadium) • Ferrous metals (hot rolling) Lead-acid battery manufacturing • Secondary Brass and Bronze Production Plants
5. Mineral processing industry	<ul style="list-style-type: none"> • Cement and lime production and/or bulk handling • Asbestos activities • Glass and glass fibre manufacturing • Ceramic production (tiles, bricks, refractory material,, stoneware, porcelain production by firing) • Coal processing/preparation plants) • Metallic mineral processing plants (crushing, screening, handling) • Non-metallic mineral processing plants (crushing, screening, handling) • Phosphate rock plants • Storage of coal and ore not on mines • Waste rock dumps and slimes dams
6. Organic chemical industry	<ul style="list-style-type: none"> • Organic chemical production including: <ul style="list-style-type: none"> ○ hydrocarbons, ○ organic compounds containing oxygen, sulphur, nitrogen or phosphorus, organometallic compounds (e.g. lead alkyls) ○ plastic materials (polymers, synthetic fibres, cellulose-based fibres) ○ synthetic rubbers ○ dyes and pigments ○ surface-active agents • Polymerising or co-polymerising any unsaturated hydrocarbon or vinyl chloride (>50tpd in aggregate - UK) • Use of toluene di-isocyanate or other di-isocyanate of comparable volatility or where partly polymerised • Recovery or purifying of acrylic acid or any ester of acrylic acid • Tyre manufacture • Storage of chemicals in bulk
7. Inorganic chemical industry	<ul style="list-style-type: none"> • Production of inorganic chemicals : <ul style="list-style-type: none"> ○ Gases (e.g. NH₃, HCl, HF, H₂S, SO_x, NO_x) ○ Acids (e.g. chromic acid, hydrofluoric acid, nitric acid, sulphuric acid, oleum) ○ Bases (e.g. ammonium hydroxide, sodium hydroxide) ○ Salts (e.g. ammonium chloride, sodium carbonate) ○ Metal oxides, metal carbonyls ○ Halogens or interhalogen compounds ○ Phosphorus and phosphate salts • Manufacturing activity involving the use of hydrogen cyanide or hydrogen sulphide • Manufacturing activity involving the use or recovery of: antimony, arsenic, beryllium, gallium, indium, lead, palladium, platinum, selenium, tellurium, thallium • Recovery of any compound of cadmium or mercury • Chemical fertilizer production • Calcium carbide production • Production of inorganic pigments • Bulk storage of chemicals • Explosives production
9. Incineration processes including hazardous waste	<ul style="list-style-type: none"> • Commercial and industrial waste incineration • Hospital/Medical/Infectious waste incineration • Municipal waste incineration
10. Wood products industry	<ul style="list-style-type: none"> • Paper, pulp and board manufacturing activities

RSA – Proposed Listed Activity Categories	Activities included
11. Animal matter processing	<ul style="list-style-type: none"> • Tanning plants • Abbatoirs • Rendering plants - animal carcasses or waste disposing or recycling

A lower limit can be set for activity, throughput or production rate, or uncontrolled emission rate to prevent the inclusion of a large number of small facilities, which would be more appropriately controlled under s23 (Controlled Emitters) of AQA if control is deemed necessary. Emission standards should be set primarily **for point sources** (stacks and vents) where emission monitoring is possible. Where the control of diffuse emissions is considered significant enough to warrant inclusion in national standards (e.g. fugitive dust at bulk ore/coal handling and processing plants and certain metallurgical industries; evaporative emissions from bulk chemical storage and handling), emission limits can be expressed in the form of specific best practice control measures which are applicable across individual industries can stipulated (e.g. floating roof tanks) or alternatively it can be required that a comprehensive fugitive emission management plan be put in place.

(3) Restriction of Emission Standard Setting to Priority Pollutants

It is recommended that only those pollutants recognised to pose a potential health threat be selected for the setting of emission standards for each industry type selected (with the exception of incineration for which an extended number of substances should be regulated in line with current local and international experience). Reference should be made to information on the US, UK and New South Wales (NSW) approaches in the selection of the most suitable substances to target. Where appropriate, use could be made of surrogate parameters to reduce compliance monitoring costs

(4) Adopt Best Available Technology (BAT) as the Basis for Emission Standards

It is commonplace in best practice legislative environments to require that emission standards take into account best available technologies and ambient air quality limits. In practice, minimum nationally-set emission standards tend to be based on best available technology, with the requirement that more stringent emission standards be set at lower tiers of government taking into account ambient air quality limits. In addition to this, the use of environmental impact assessments for informing emission standards for new and modified facilities is widely accepted. This provides a safety net in cases where minimum emission standards best on BAT are not sufficient to protect local environments.

Given that provision is made in the AQA for the setting of more stringent emission standards by provincial and local authorities, it is *recommended that the national minimum emission standards be based on best available technology.*

Best available technology, despite being defined in slightly different terms (or not defined at all in regulation as in the case of NSW), is implemented in similar ways in the case studies considered. It is *recommended that South Africa adopt the concise EU definition of BAT, viz.:*

'Best available techniques' shall mean the most effective and advanced stage in the development of activities and their methods of operation which indicate the

practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole:

- **'techniques'** shall include both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned,
- **'available'** techniques shall mean those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the [country] in question, as long as they are reasonably accessible to the operator,
- **'best'** shall mean most effective in achieving a high general level of protection of the environment as a whole.

In the application of BAT for the purpose of informing emissions standards and monitoring protocols for the prioritized industry types, reference should be made to the best practice documentation published under the European Union Integrated Pollution Prevention and Control (IPPC) directive and UK and US legislation.. In assessing the economic viability of technologies within local industries, the simpler approach adopted by NSW could be considered whereby use is made of previous studies undertaken and information provided by industries within the sector to be regulated. Emission standards should not prescribe the use of one specific technique of technology (technology forcing).

(5) Format for Expressing Emission Standards

The AQA stipulates that emission standards “must include the *permissible amount, volume, emission rate or concentration* of that substance or mixture of substances that may be emitted and the manner in which measurements must be carried out”. This requirement in the Act largely developed as a result of the manner in which emission standards have historically been specified within APPA Registration Certificates (i.e. typically as emission concentrations without limits on volumetric flows or on total masses of emissions). The specification of a total mass as a “permissible amount” or a “volume” in a general national minimum emission standard intended to regulate a number of individual industries is problematic, unless it is specified on a per unit production or output basis i.e.a performance standard.

It is recommended that emission standards be expressed either as an emission concentration or a performance standard (i.e amount of pollutant emitted per unit of activity) or, where appropriate, a combination of both with the actual concentration or level of performance taken from BAT. Total masses of emissions permissible can be included in the Atmospheric Emissions Licenses of Listed Activities.

(6) Specification of General Emission Standards

Certain countries (e.g. Australia-NSW, China) specify general emission standards for application to industries for which sector-specific emission standards are not applicable. Taking into account the recommendation that a select list of industry types be prioritised for the setting of specific emission standards, South Africa should consider the use of general emission standards for application to industries which are not initially listed.

(7) Emission Monitoring Specified on the Basis of Best Practice

The emission monitoring required clearly depends on the nature of the source, the pollutant and the emission standard. Emission standards expressed as emission concentrations require direct stack monitoring. The sector-specific monitoring method and frequency should be taken from the best practice documentation (e.g. EU's Monitoring BREF). In most cases, continuous emissions monitoring is prescribed for the larger sources of criteria pollutants as is typically best practice, with periodic (e.g. annual) testing campaigns stipulated for metals, persistent organic compounds (etc.). Emission standards expressed as a performance standard (e.g. kg of pollutant per ton product) requires a combination of direct monitoring and product tonnage tracking methods.

(8) Emission Standards should be varied to account the Age of Facilities

The setting (retention) of less stringent emission standards for older facilities has a place in the regulatory process of most of the countries considered. It is however notable that these emission standards are not static, but that there are timeframes within which facilities are expected to meet firmer standards. Generally, the approach adopted is to link required improvements to major plant modifications and to take advantage of industry cycles. This is most readily expressed in the NSW regulations where older plants are given five year timeframes to institute upgrades which will bring them in line with more stringent emission standards.

Whereas the US tends to include the dates of facilities within individual industry specific standards, NSW sets out clear industry facility age categories which are applicable across all industry sectors regulated. The NSW approach is simple to understand, lends itself to being more readily used to stipulate cross-sector continuous improvement requirements, and can be more easily revised. This approach is recommended for implementation in South Africa.

(9) Compliance Schedules should be Informed by Industry Cycles

Based on international experience, an effective approach would be to set minimum timeframes for compliance nationally (taking account of industry cycles), with provision being made for more restricted compliance schedules to be specified by lower government tiers for industries within their jurisdictions and/or stricter timetables being negotiated for inclusion in permits. Typical compliance timeframes, based on the US, EU and NSW case studies would be:

- 2 to 3 year in the case of new or substantially modified facilities
- 5 to 10 years in the case of existing facilities, potentially differentiated by age

(10) Provision for Extensions to Compliance Timeframes on a Case-by-case Basis

Given potential economic implications of emission standards, and mindful that emission standard setting in South Africa is not likely to be based on comprehensive sector-based cost-benefit analysis (at least not for the initial group of 'listed activities'), it is recommended that provision be made for specific industries to apply for possible extensions to compliance timeframes. The proponent of a listed activity should be allowed to apply for a postponement of the compliance date and for such a postponement to be granted based on the following conditions being met:

- An air pollution impact assessment being completed (in accordance of the format for Atmospheric Impact Reports, as contemplated in Section 30 of the NEM:AQA and specified by the National Air Quality Officer) and submitted to DEAT at least 1 year before the compliance date; and
- Demonstration that the industry's air emissions are not causing any adverse impacts on the surrounding environment.

This provision would ensure that any requirement to upgrade is informed by an understanding of any environmental impact of the affected plant. At the end of the extension period granted a further extension could be made possible subject to a repeat of the impact assessment process.

(11) Cost-benefit Analysis (CBA) should Inform the Future Listing of Activities

Given the short timeframe within which the Minister is expected to publish a 'list of activities' so as to meeting the APPA to AQA transitional phase objectives, it is unlikely that detailed sector-specific CBA will be completed in time to inform the initial listing of activities. It is therefore recommended that the initial list of activities comprise a restricted number of industry types which are know to be potentially significant in terms of their atmospheric emissions (see section 2). The targeting of industries where the benefits of regulation are expected to outweigh the costs, based on experience from developed and developing countries, would substantially reduce the risks of economic impacts arising due to the emission standards set. Additional measures to reduce risk during this initial phase include: (i) restricting pollutants for which emission standards are specified to the key ones for that industry type (see section 3) thus also reducing compliance monitoring and reporting costs; (ii) taking industry cycles into account in the setting of national minimum compliance timeframes, and (iii) making provision for industries to apply for extensions based on atmospheric impact assessments being undertaken.

In targeting industry sectors for which information on emissions and impacts is less available or conclusive, particularly those comprising small and/or older operations, it is imperative that detailed CBAs be undertaken in selecting BATs and setting emission standards. Provision for such studies should be made so as to extend the list of activities and associated set of national minimum emission standards in a manner which does not lead to economic impacts or mass non-compliance.

(12) Considerations during Emission Standard Implementation

In the implementation of emission standards, best practice necessitates comprehensive compliance monitoring and enforcement functions and the regular review of such standards in line with BAT developments. Provision should be made for these functions to be implemented and maintained after the initial standard setting activity has been completed.